

✓ of GOR'KIY PHYSICO-TECHNICAL RESEARCH INST (GIFTI) (PHOTONEPHELOMETERS)

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### Translation

~~This article describes the construction of two new photonephelometers~~  
have been <sup>and constructed</sup> ~~which were developed by the Gor'kiy Physico-Technical Research Insti-~~  
tute. One of these instruments is intended for automatic control  
of the calcium content in a saturated solution of table salt, the other  
for determining small quantities of sulphates in aluminum powder.

Instruments based on the principle of light diffusion ~~which are~~  
<sup>enough for these purposes.</sup> ~~not too sensitive to the given substances.~~ It was therefore necessary  
to develop an instrument ~~which was capable of nephelometric measurements,~~  
~~based on the intensity of a light stream passing through a cloudy (turbid) solution.~~

The differential circuits of the photonephelometers, <sup>which were</sup>  
~~was~~ <sup>this work,</sup> the best that could be devised for ~~the given purpose,~~ includes two  
selenium photo <sup>cells</sup> ~~elements~~ which are connected to one another by their oppo-  
site ~~poles.~~ <sup>in opposition.</sup> A zero galvanometer is hooked up in parallel to the photo <sup>cells</sup>  
~~elements~~ and serves as an indicator of the electric equilibrium <sup>(balance)</sup> in the  
circuit. A potentiometer serves as a compensator

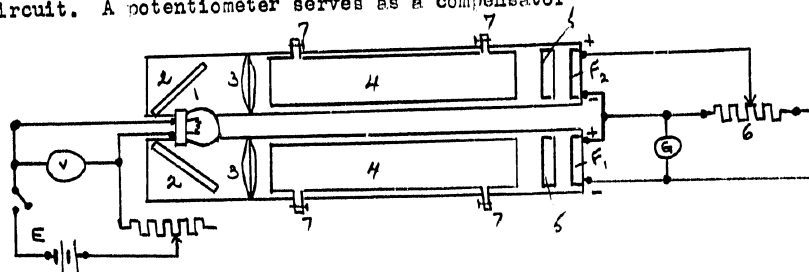


Fig 1 - Schematic Diagram of the FOLO-46 Photonephelometer

PHOTONEPHELOMETER FOLO-46 (Fig 1), can measure calcium content <sup>within the range</sup> ~~down to~~  
1-5 mg per liter of saturated solution of table salt.

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The optical part of the FOLO-46 consists of two parallel horizontally placed aluminum pipes, which are attached to the main chassis of the instrument.

An electric bulb (1) serves both parts of the instrument simultaneously. The light beams are deflected by metal mirrors (2) which are placed at an angle of  $45^\circ$  to the base of the instrument. The rays are then brought together by a condensing lens (3) and after passing through the sleeves<sup>1</sup> (4) act on photo<sup>cells</sup> ~~elements~~  $F_1$  and  $F_2$ . A diaphragm (5) is placed in front of the compensating photo<sup>cells</sup> ~~elements~~. The indicating devices consisting of a voltmeter and zero galvanometer are located on the front panel of the instrument.

The electrical part of the instrument is centered on the panel along with the potentiometer (6) and its graduated dial. The solution to be studied is admitted to the sleeves through valves (7). Fig 2<sup>2</sup> is a general view of the instrument.

~~In order to zero the~~  
~~So as to have the galvanometer register zero,~~ both sleeves are filled with pure brine. Valve "a" (Fig 3) is closed while valves "b" and "c" are opened. The system is balanced by using diaphragms (5) to regulate light rays (see Fig 1).

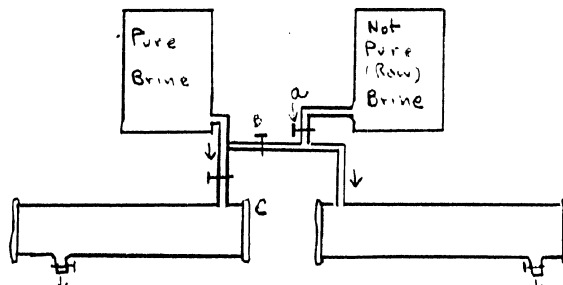


Fig 3 Schematic Diagram of Pipe Arrangement in FOLO-46 Photophelometer  
After determining the "zero" point, the lower sleeve is filled

with the solution to be studied. Valve "b" is closed and valve "a" is opened. The equilibrium which is thus destroyed is re-created by rotating the potentiometer knob until the needle on the galvanometer points to "zero". A graduated graph is drawn up to permit <sup>evaluation</sup> ~~determination~~ of the calcium content.

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PHOTONAPHELOMETER FON-47 is used for nephelometric determination of sulphate content in aluminum powder <sup>in the range</sup> ~~and has a sensitivity of 0.05 - 1~~ mg. sulfate in 150 ml. of solution <sup>at 0.05 mg. intervals.</sup> ~~The instrument is graded so as to~~ register sulfate content at 0.05 mg. intervals. The instrument can also be utilized as a photocolormeter for determining iron (concentrations of 0.005 to 0.05 mg. iron in 50 ml. of solution at intervals of 0.005 mg.) and other elements.

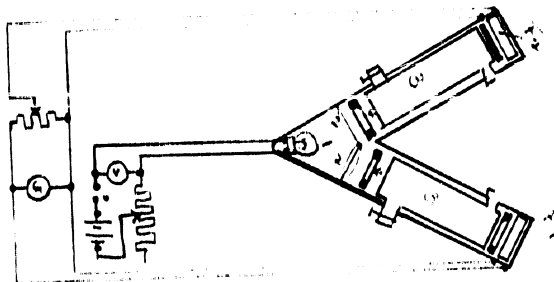


Fig 4 Schematic Diagram of the FON-47 Photo-nephelometer  
The optical part of the instrument (Fig 4) consists of two ~~photo~~ tubes

(which are in themselves complete optical units) placed at an angle to one another. Bulb (1) serves both units at the same time. The light rays are brought together by a condensing lens (2) and after passing through the sleeves (3), act on photoelements <sup>cells</sup> F<sub>1</sub>, F<sub>2</sub>.

<sup>For</sup> ~~So as to~~ balance the instrument, a diaphragm is placed before the photoelements <sup>cells</sup> when the sleeves are being filled with "zeroing" solution.

<sup>contains</sup> The front panel ~~contains~~ a zero galvanometer (1), a voltmeter (2), scaled knob for the potentiometer (3), <sup>and</sup> bulb socket equipped with screws a, b, and c, which permit the regulation of light rays in three directions (Fig 5).<sup>3</sup>

The instrument is equipped with two types of sleeves: a 100 ml. capacity sleeve is used for measuring turbidity, while a 20 ml. capacity sleeve is used in photocolormetric work.

Very accurate measurements can be obtained when using this instrument for measuring sulphate content. It is also possible to

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carry out measurements of iron content in half the time required for old instruments.

1. The original text contained the work "kyuvet" meaning "drain ditch".

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